APPENDIX B

CAMOUFLAGE AND DISPERSAL

B-1. DEFENSIVE MEASURES

a. Types. An installation's ability to survive are enhanced by two basically complementary defensive measures: active and passive. The best defense is built on a combination of those two measures, rather than depending on either category alone. However, each local situation must be assessed in order to determine the most effective mix of defense methods. For example, some locations might lack adequate land area for dispersal and will rely primarily on active defense measures, although in such cases, the threat may be so limited that active measures would not be required.

b. Active Measures. Active defenses complement passive defenses by degrading the accuracy of weapons delivery and by limiting the effectiveness of enemy ground and air attack. Active defense can save resources by destroying some or all of the attacking force before an attack or by degrading the electronics of enemy weapons systems, rendering them ineffective. Use of antiaircraft units and ground security forces can significantly improve an installation's survivability chances by limiting the strength and number of enemy attacks. The effectiveness of active defenses can be measured in terms of what is saved and the attrition rate of enemy forces.

c. Passive Measures. Passive defenses, such as camouflage and dispersal, complement active defenses by rendering the target difficult, if not impossible, to locate and contain. Passive measures can force the enemy to use weapons and tactics that increase exposure to active combat units, antiaircraft, and perimeter security forces. The effectiveness of passive defenses can be measured in terms of targets saved or in terms of increased enemy effort. This chapter discusses how camouflage and dispersal can increase base security.

B-2. CAMOUFLAGE

Camouflage is a concealment technique that includes hiding from view, making it difficult for the enemy to see clearly, arranging visual obstructions, and disguising objects. When used correctly, camouflage can minimize a fixed installation's vulnerability to enemy attack. Furthermore, camouflage can be thought of as a counter-surveillance technique because it can mislead, confuse, or deny vital military information to enemy surveillance systems. Although a fixed installation usually cannot be totally concealed, camouflage should at least conceal key elements, forcing enemy intelligence to draw incorrect conclusions about an installation's operations.

a. Concealment Principles.

(1) Surveillance Technology. With advancements in the technology of surveillance systems, creating sophisticated sensors and weaponry that effectively camouflage a fixed installation has become increasingly difficult; however, certain concealment principles remain effective for enhancing the probability of an installation's survival. Paragraphs *(2)* and *(3)* below briefly discuss the principles of concealment from both direct (people) and indirect (photographic) observation.

(2) Recognition Factors. Since the eye is the most adaptive and responsive sensor, the objective of fixed installation camouflage is to confuse and deceive the eye by countering the factors that the eye needs to identify objects. Paragraphs *(a)* through *(f)* below explain those recognition factors.

(a) Shape. All objects have a characteristic shape or outline that identifies them even before details can be seen. Camouflage can hide or disguise the shapes of standard recognizable objects.

(b) Shadow. An object's characteristic shadow, or projection of its shape, may be more revealing than the object itself, especially if viewed from above. A shadow can be disguised by ground patterns, plantings, or false forms.

(c) Color. Color can aid an observer if there is a contrast between the object and its background. Light or bright colors tend to attract the eye, whereas darker or subdued colors tend to blend an object into the background.

(d) Texture. Texture refers to an object's ability to reflect, absorb, or diffuse light and can be defined as the relative roughness or smoothness of an object. For example, an airstrip, even though painted to match adjacent grassy areas, will appear much lighter in an aerial photograph because the textures differ.

(e) Position. An object can often be identified by its position in relation to its surroundings. For example, a long object on a railroad track is assumed to be

a train. Similar objects on a river floating parallel to its banks are assumed to be boats or barges.

(f) Movement. Movement does not necessarily identify an object, but will draw an observer's attention. Vehicle tracks or a change in the position of a piece of equipment can be as noticeable as movement to trained observers.

(3) Concealment. Two principles of concealment--siting and discipline--can diminish the negative effects of the recognition factors listed in *(2)* above.

(a) Siting. The purpose of siting is to select the most advantageous location for hiding an object. Often, a site's natural slope and vegetation make elaborate camouflage unnecessary. Vital elements can be dispersed in order to blur the installation's tactical mission and increase its likelihood of survival during an attack.

(b) Discipline. For fixed-installation camouflage, all personnel must adhere to the concealment principles used to protect the installation. For example, if a crane on a loading dock is carefully concealed, but empty oil drums, litter, and vehicle tracks can be seen around the area, then security has been compromised. Observers could then deduce that the concealed object is critical without ever knowing exactly what it is.

b. Concealment Methods.

(1) Traditional Methods. Individuals charged with camouflaging an installation have traditionally used four methods of concealing structures and activities:

(a) Hiding. Obstruct a sensor's field of view with natural terrain or foliage.

(b) Deceiving. Mislead the enemy by manipulation, distortion, or falsification of evidence, inducing the enemy personnel to react in a manner prejudicial to their interest.

(c) Blending. Match an object's reflectance characteristics to its background.

(d) Disguising. Give a sensor a false impression about an object.

(2) Expanded Methods. However, in order to carry out a successful camouflage operation, the four traditional methods must be expanded. Therefore, five more camouflage methods should also be considered:

(a) Masking. Obstruct a sensor's field of view with artificial cover such as a net.

(b) Blinding. Saturate a sensor, reducing its effectiveness or damaging it permanently.

(c) Disrupting. Eliminate or modify distinct object patterns.

(d) Distracting. Focus an enemy's attention away from an object.

(e) Decoying. Provide an effective false object.

c. Runways and Taxiways. Although runways and taxiways cannot be protected from detection if they are subject to continued visual and photographic aerial observation, they would be harder to recognize quickly at the usual bombing altitudes and speeds of modern aircraft if background color contrast were diminished and/or texturing materials added to tone down normal smooth and glaring surfaces.

d. Modular Lightweight Camouflage Screening System. AFCS does not include a camouflage facility for any structure. Instead, AFCS provides diagrams and charts that enable the user to develop adequate camouflage protection using the Army Modular Lightweight Camouflage Screening System. That system consists of a standard set of two nets (a hexagon and a diamond) and supporting equipment. Connecting the nets in various configurations produces the desired screen size. The Modular Lightweight Camouflage Screening System is not an AFCS design; therefore, it must be acquired separately, by NSN, through the supply system.

e. More Camouflage Information. Further discussion about camouflage is beyond the scope of this manual. It should be noted, however, that successful camouflage requires the use of locally available materials as well as the proper siting and dispersal of structures with regard to existing vegetation and terrain. For more information, see FM 5-20 and TM 5-200.

B-3. DISPERSAL

Dispersal is a cost-effective passive defense measure that depends on tactical and operational requirements, terrain limitations, and available engineer resources. Dispersal eliminates the possibility of sympathetic explosions, complicates enemy attack, and causes the enemy to make multiple passes for each sortie in order to destroy the dispersed aircraft or facilities effectively. Some drawbacks of ground dispersal of aircraft are increased communications and security problems and possible new construction for additional taxiways and hardstands; on the other hand, dispersal should cause little or no degradation to a unit's operational capability. The relative merits of dis-

persal in any given situation must be weighed against the threat analysis and any extra man-hours required.

a. Dispersal Principles.

(1) Separation Distances. Optimum dispersion occurs when the enemy must attack each parked aircraft, vehicle, or facility as a separate target.

(2) Site Choice. Protection against enemy observation can be made much easier by choosing sites with a wide variety of ground features broken by irregular patches of trees and scrub growth.

(3) Use Natural Terrain. The dispersal (and camouflage) plan must take full advantage of terrain and its natural vegetation. The guiding principle should be to preserve the site's existing pattern and character.

(4) AFCS Requirements and Dispersal. The area and facilities of AFCS installations are based on operational requirements only; defensive measures beyond those for the anticipated minimal air threat in the communications zone are not emphasized. Therefore, the planner should consider increasing the number of linking facilities (roads, utilities, etc.) whenever significant dispersal is required.

b. Dispersal Methods.

(1) Personnel Facilities. Dispersal of personnel facilities depends on the limits of real estate, operational effectiveness, and installation security considerations.

(2) Power Generation. Installation power generation should be located in two separate areas, with several individual generators at each location. Those generators should be positioned with adequate separation between each unit in order to provide maximum survivability. Overhead power transmission lines and their transformers should be routed and spaced in a manner that will preclude the loss of more than one circuit as a result of one attack. Backup generator units that supply power to critical facilities, with their associated high voltage distribution centers and electrical distribution circuit cabling, should also be dispersed.

(3) Maintenance Facilities. Maintenance facilities should be dispersed so that separation is consistent with terrain features.

(4) Stored Munition. Accidental or deliberate detonation of stored munitions can be reduced by maximum separation between explosives and other resources. Explosives should be dispersed into small compatible groups. Ammunition storage should not be located on an area's periphery where it could be damaged easily by small arms fire.

(5) Key Operations. Splitting key storage or other operations into suboperations can provide effective dispersion. For instance, the storage of one type of conventional ammunition could be split between the operating sections of an ammunition installation in order to minimize the impact of an enemy attack. Key elements of an installation should be located so that they are properly concealed and protected from ground attack by infiltrators and guerrillas.

(6) Petroleum, Oil, Lubricant (POL). The survivability of POL storage and dispensing systems can be increased by use of air transportable systems. Those systems include portable storage tanks and dispensing systems that may be dispersed and surrounded by earthen dikes. Fuel should not be stored on the periphery of an area where it could be damaged easily by small arms fire.

(7) Motor Vehicles. Motor vehicles should not be pooled. Parking motor vehicles under or beside trees or next to earthen embankments can provide dispersal as well as partial concealment.

(8) Aircraft.

(a) Parked Aircraft. Random dispersal of parked aircraft can increase their survivability during an attack, since sortie requirements of attacking aircraft increase from two to four times when aircraft parked at 50-foot separations are changed to irregular parking with minimum separations of 300 feet. An aircraft dispersal plan should take into consideration operational requirements, maintenance, base security, existing parking areas, and the availability of real estate for additional aircraft parking.

(b) Runways and Taxiways. A survivability measure for runways and taxiways is base selection. A runway of minimum length and width could be made useless when hit with one bomb; however, portions of a larger runway could be used for emergency launch and recovery of aircraft after several hits.

(c) Air Traffic Control Facilities. Navigational aid and air traffic control facilities normally should be dispersed because operational considerations require that they be isolated from other facilities.

(d) Dispersal Layouts. Figures B-1 through B-4 show proposed layouts and dispersal patterns that may meet a variety of tactical operations with minimum construction effort. Those layouts were developed as guidance for field commanders and units in TO's and for use by planners at higher levels of command.

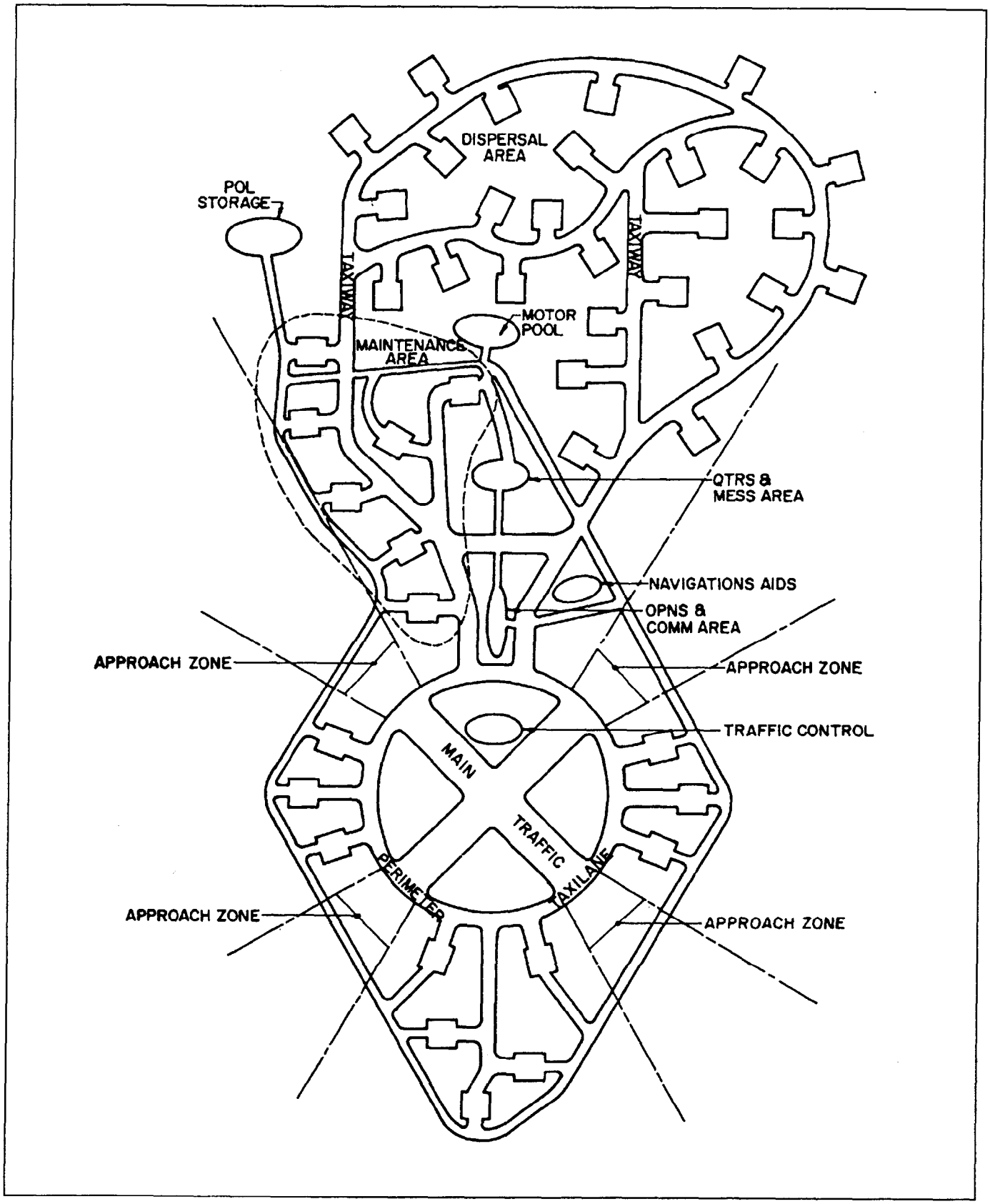

Figure B-1. Dispersal heliport layout

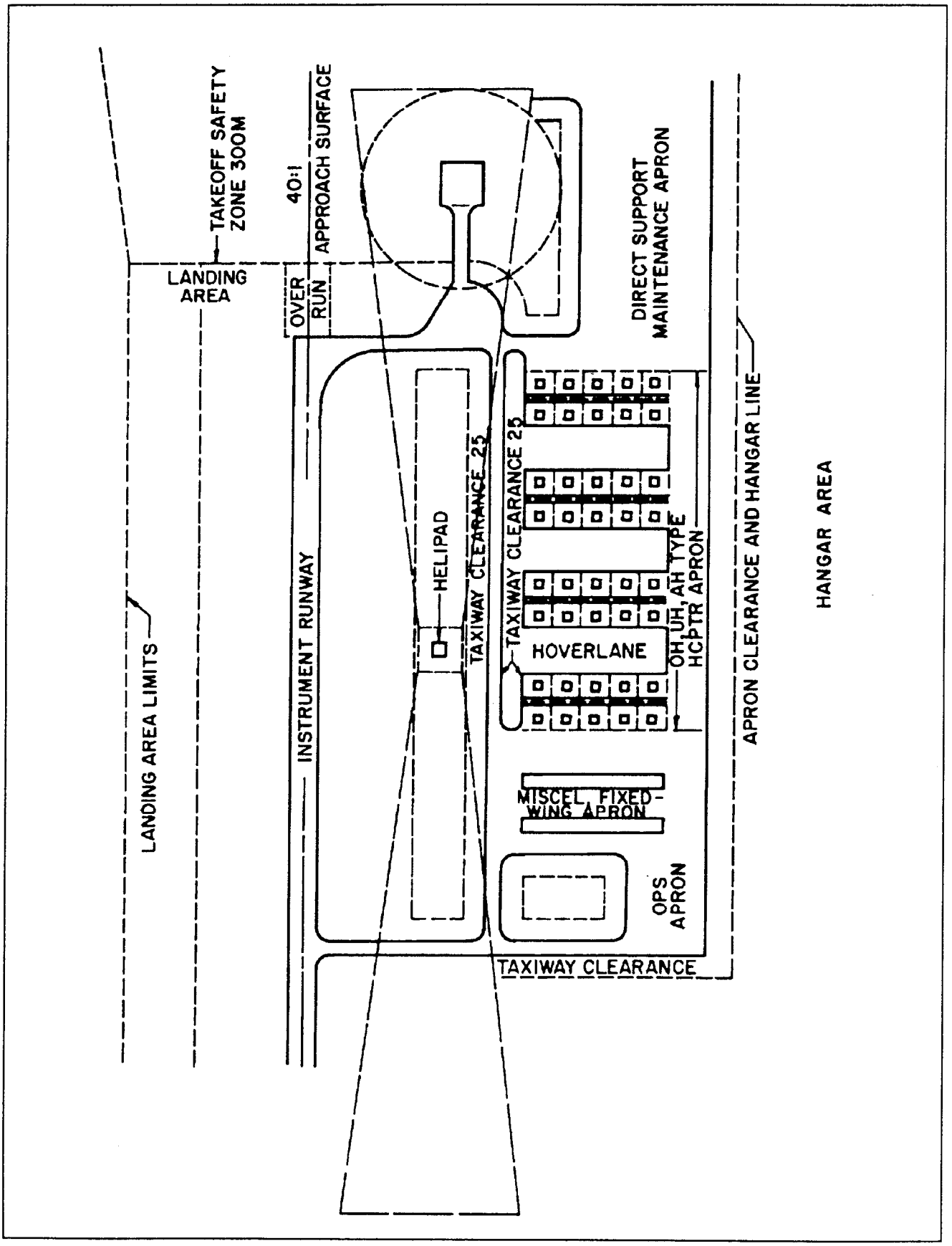

Figure B-2. Heliport layout, friendly air superiority

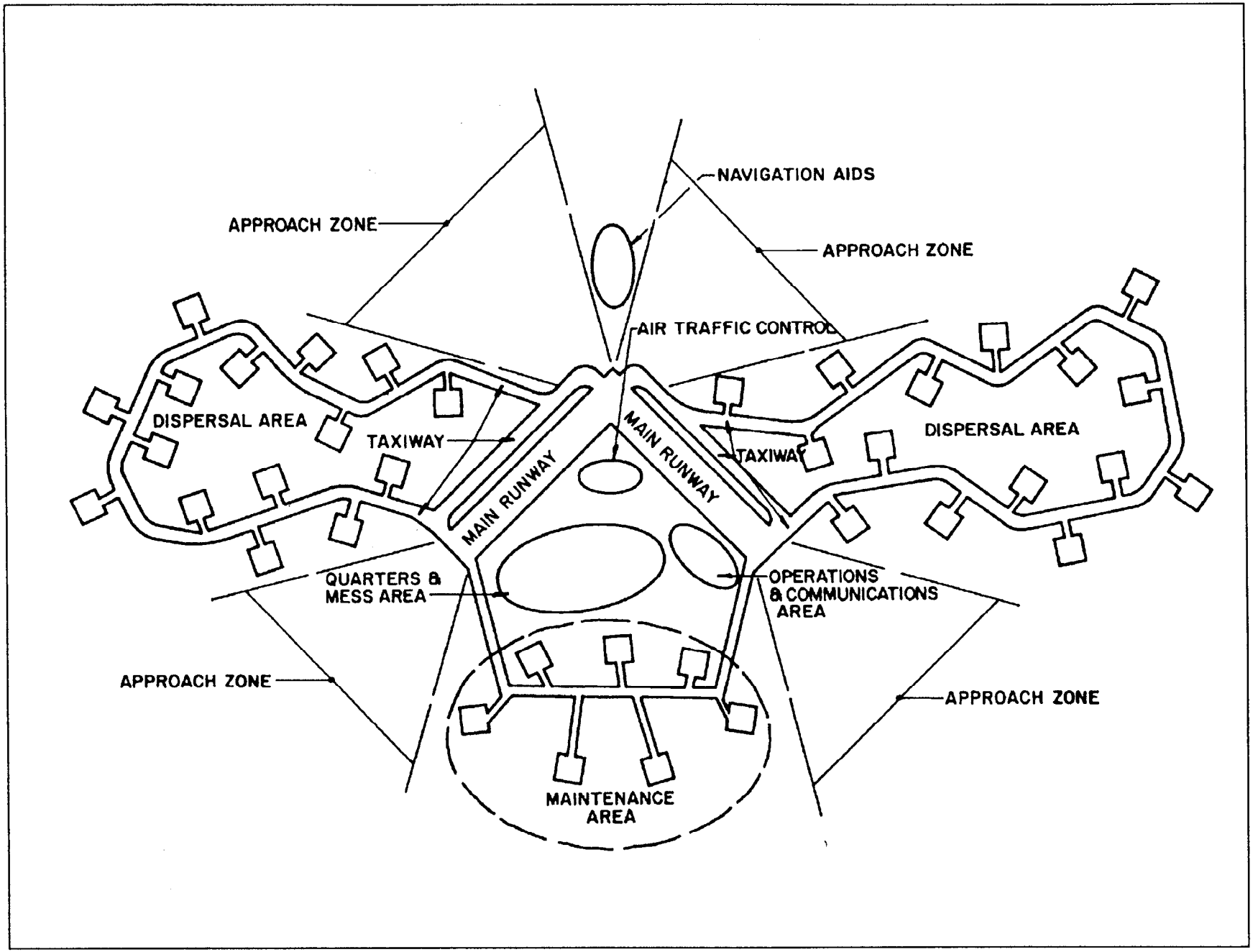

Figure B-3. Layout, all types of aircraft

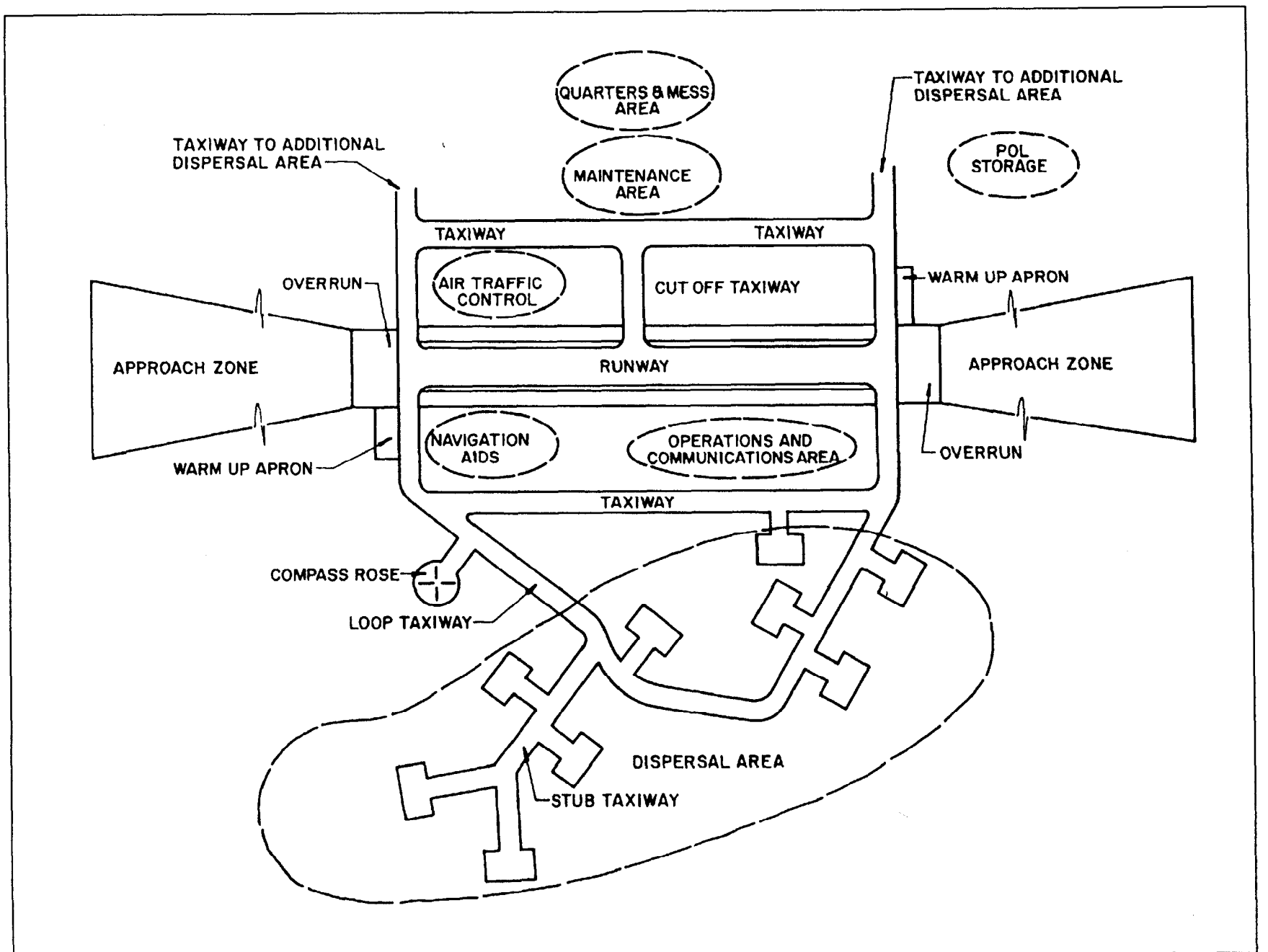

Figure B-4. Fixed-wing aircraft layout